

THE DELIMITATION OF ARENARIA  
(CARYOPHYLLACEAE) AND RELATED GENERA IN  
NORTH AMERICA, WITH  
11 NEW COMBINATIONS IN MINUARTIA

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Throughout this century most North American botanists have followed Fernald (1919) in adopting a very broad circumscription of *Arenaria* L. (Caryophyllaceae), whereas botanists in other parts of the world have almost invariably recognised a number of genera of which five (*Arenaria*, *Moehringia* L., *Minuartia* L., *Honckenia*<sup>1</sup> Ehrh., and *Wilhelmsia* Reichenb.) are represented in North America. This narrower generic concept has been adopted not only by monographers of the genera (e.g. *Arenaria*: Williams 1898, *Minuartia*: Mattfeld 1922b, *Honckenia*: Pobedimova 1960) but also in the *Pflanzenfamilien* (Pax & Hoffman, 1934) and in the major Eurasian floristic works (Shishkin, 1936; Walters, 1964). The characters distinguishing the segregate genera are outlined in McNeill (1962), who also analyses the criteria for generic delimitation.

Two groups of genera exist. In one the capsule opens by as many valves as there are styles, whereas in the other capsule dehiscence is by twice as many valves or teeth as styles. The first group comprises the large genus *Minuartia* and the maritime and riparian genera *Honckenia* and *Wilhelmsia* each of which contains a single species or species complex. These genera are referred to the subtribe Sabulininae along with others that show similar capsule dehiscence such as *Sagina*. The other group resembles *Stellaria* and *Cerastium* in capsule dehiscence and is included with them in the subtribe Stellariinae. This group consists of *Arenaria* itself and the predominantly European *Moehringia* which is distinguished by its appendaged ('strophiolate') seeds.

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<sup>1</sup>Manitz (1975) and Rauschert (1977) have pointed out that in the long-overlooked original publication of this name Ehrhart (1783) used the spelling *Honckenia* although in 1778, in a republication of the name (hitherto considered the original publication), he altered the spelling to *Honkenya*. My examination of these publications confirms Rauschert's conclusions: Ehrhart in 1783 named *Honckenia* "in honorem nostri meritissimi Dom. *Honckeny*, Auctoris Florae Germanicae"; as this is the usual spelling of G. A. Honckeny, no typographic or orthographic error is involved and Ehrhart's change in the spelling five years later must be treated as an orthographic error. (Stafleu et al., 1978: Art 73.1).

An increasing number of taxonomic treatments of North American species are adopting some or all of these genera (e.g. Nannfeldt, 1954; Hultén, 1958, 1967, 1968, 1971 & 1973; Löve & Löve, 1965; Weber, 1967; Löve et al., 1971; McCormick et al., 1971; McNeill & Bassett, 1974; Shetler & Skoog, 1978; and Porsild & Cody, 1980). These include two important floristic works (Hultén's *Flora of Alaska* and Weber's *Rocky Mountain Flora*), and this has led to considerable confusion in uncritical compiling of species lists for North America. The purpose of this paper is to clarify generic delimitation so far as the North American species are concerned and to publish the new combinations required for forthcoming checklists of the vascular plants of North America north of Mexico (Biota of North America Committee) and of the United States and its territories in the Carribean area (U.S. Soil Conservation Service).

Despite the confusion that exists, the problem is not one of generic circumscription but the much simpler matter of rank. It has been complicated, however, by the nomenclatural history of the genus that is correctly called *Minuartia*. Until the end of the nineteenth century this was generally known as *Alsine* L. (a name correctly typified by *Stellaria media* (L.) Vill.). Of those American botanists in the early part of this century who did recognise the genus, only Farwell (1919) and House (1921) used the name *Minuartia*. Small (1903, 1933) and Rydberg (1923, 1932) first called it *Alsinopsis* Small then *Sabulina* Reichenb., ignoring *Minuartia* and using *Alsine* for *Stellaria* (except Rydberg, 1932).

Fernald's (1919) analysis of the generic delimitation of *Arenaria* is somewhat superficial and in some places inaccurate. His claims that the capsule dehiscence character is both difficult to determine and separates closely related species are false. As Mattfeld (1922a) and McNeill (1962) note, the incipient lines of dehiscence are visible even in the immature ovary and no case of between species affinity running across generic boundaries drawn on the basis of this character is known in the Alsinoideae (unlike the Silenoideae, cf. McNeill, 1978). The one specific example given by Fernald, that of *A. paludicola* Robinson, is the result of erroneous observation of the capsule dehiscence in this species, a point already noted by Briquet (1911). Fernald's other criticisms are either of characters that are not in fact used to discriminate the genera or else represent assumptions of affinity based on superficial resemblance in habit, parallel-

ing that between *Arenaria* and *Gypsophila* (Silenoideae) or even *Phlox* in the Polemoniaceae.

Maguire (1951) in his conspectus of the species of *Arenaria* (*sensu latissimo*) in America north of Mexico essentially follows Fernald, even to his mistake over *A. paludicola*, and admits to not having attempted detailed justification of his generic limits. Nevertheless because the disagreement is one of rank, four of the five genera are identifiable in the sectional classification that Maguire uses. The fifth, *Honckenia*, is excluded by Maguire, presumably because he did regard it as a distinct genus. *Arenaria* comprises his Sections *Euthalia* (= *Arenaria*), *Leiosperma* and *Pentadenaria* (species 1–19 & 36); *Moehringia* is Section *Moehringia* (species 20–21); *Wilhelmsia* is Section *Merckia* (species 22) and *Minuartia* is his “Section *Alsine*” (species 23–35 & 37–41) with *A. paludicola* (species number 36) transferred to *Arenaria* subgenus *Leiosperma* (see McNeill, 1962). Maguire’s treatment of the species is in some need of revision (cf. Hickman, 1972; McNeill, in prep.) but it still serves as a useful synopsis of these genera in North America.

The desirability of discriminating *Minuartia* from *Arenaria* is not in doubt. The status of the other genera is, however, more debatable. *Honckenia* and *Wilhelmsia* are clearly related to *Minuartia* and although readily distinguishable are assigned generic rank largely because of their distinct habit and other features, such as large seeds, that are probably associated with their specialised maritime or riparian habitats. *Moehringia* is a small cohesive genus of about 25 species almost all in Europe. It has been traditionally kept separate from *Arenaria* but appears scarcely more distinct than some of the subgenera of *Arenaria* are from each other. Although the two North American species could well be included in *Arenaria*, from a world viewpoint it seems best to maintain the genus at least until its possible relationship with *Arenaria* Subgenus *Leiosperma* is clarified (cf. McNeill, 1962).

In recent years some subdivision of both *Arenaria* and *Minuartia* has been proposed. Ikonnikov (1973) has raised *Arenaria* Subgenus *Eremogone* (= Section *Pentadenaria* in Maguire, 1951) to generic rank (as *Eremogone* Fenzl) and Löve and Löve (1974, 1975a, 1975b and in Löve & Kjellqvist, 1974) adopt this genus and treat most of Mattfeld’s (1922b) and McNeill’s (1962) sections of *Minuartia* as genera as well as two of McNeill’s sections of *Arenaria* subgenus

*Arenaria*. The latter are not represented in North America but five of the former are: *Alsinanthe* (Fenzl) Reichenb., *Porsildia* Löve et Löve, *Wierzbickia* Reichenb., *Lidia* Löve et Löve, and *Tryphane* (Fenzl) Reichenb. There is some argument on morphological grounds for the recognition of *Eremogone* but in segregating so many genera Löve and Löve seem to have been unduly influenced by differences in chromosome base number. The genera that they recognise are rather small groups of related species, better treated as sections either of the morphologically homogeneous *Minuartia* or of the equally homogeneous *Arenaria* subgenus *Arenaria*.

Because of the slow adoption in North America of the correct generic name *Minuartia* the following new combinations in that genus are required. Along with the usual convention of  $\equiv$  for homotypic synonyms and = for heterotypic ones, I am following Greuter (1973) in using — for misidentifications.

#### NEW COMBINATIONS IN MINUARTIA

- Minuartia cumberlandensis** (Wofford et Kral) McNeill, *comb. nov.*  
 $\equiv$  *Arenaria cumberlandensis* Wofford et Kral, *Brittonia* **31**: 257 (1979).
- Minuartia douglasii** (Fenzl ex Torrey et A. Gray) Mattf. var. **emarginata** (H.K. Sharsm.) McNeill, *comb. nov.*  
 $\equiv$  *Arenaria douglasii* Fenzl ex Torrey et A. Gray var. *emarginata* H.K. Sharsm., *Amer. Midl. Nat.* **34**: 337 (1945).  
 $\equiv$  *Arenaria emarginata* (H.K. Sharsm.) Hoover, *Leafl. W. Bot.* **10**: 343 (1966).
- Minuartia filiorum** (Maguire) McNeill, *comb. nov.*  
 $\equiv$  *Arenaria filiorum* Maguire, *Bull. Torrey Bot. Club* **73**: 326 (1946).
- Minuartia godfreyi** (Shinners) McNeill, *comb. nov.*  
 $\equiv$  *Arenaria godfreyi* Shinners, *Sida* **1**: 51 (1962).  
 $\equiv$  *Stellaria paludicola* Fernald et Schubert, *Rhodora* **50**: 197 (1948), non *Arenaria paludicola* Robinson, nec *Minuartia paludicola* (Robinson) House  
 - *Minuartia uniflora* sensu Mattf., *Repert. Spec. Nov. Regni Veg. Beih.* **15**: 16–17 (1922), non (Walter) Mattf.  
 - *Sabulina uniflora* sensu Small, *Man. S.E. Fl.* 498–499 (1933), non (Walter) Small

**Minuartia muriculata** (Maguire) McNeill, *comb. nov.*

≡ *Arenaria muriculata* Maguire, Amer. Midl. Naturalist **46**: 507 (1951).

**Minuartia nuttallii** (Pax) Briq. subsp. **fragilis** (Maguire et A.H. Holmgren) McNeill, *comb. nov.*

≡ *Arenaria nuttallii* Pax subsp. *fragilis* Maguire et A.H. Holmgren, Madroño **8**: 260 (1946).

**Minuartia nuttallii** (Pax) Briq. subsp. **gracilis** (Robinson) McNeill, *comb. nov.*

≡ *Arenaria nuttallii* Pax var. *gracilis* Robinson, Proc. Amer. Acad. Arts **29**: 304 (1894).

≡ *Arenaria nuttallii* Pax subsp. *gracilis* (Robinson) Maguire, Madroño **8**: 461 (1946).

**Minuartia nuttallii** (Pax) Briq. subsp. **gregaria** (A.A. Heller) McNeill, *comb. nov.*

≡ *Arenaria gregaria* A.A. Heller, Bull. S. Calif. Acad. Sci. **2**: 67 (1903).

≡ *Arenaria nuttallii* Pax var. *gregaria* (A.A. Heller) Jepson, Fl. Calif. **1**: 492 (1914).

≡ *Arenaria nuttallii* Pax subsp. *gregaria* (A.A. Heller) Maguire, Madroño **8**: 261 (1946).

**Minuartia patula** (Michaux) Mattf. var. **robusta** (Steyerm.) McNeill, *comb. nov.*

≡ *Arenaria patula* Michaux forma *robusta* Steyerm., Rhodora **43**: 330 (1941).

≡ *Arenaria patula* Michaux var. *robusta* (Steyerm.) Maguire, Amer. Midl. Nat. **46**: 507 (1951).

**Minuartia pusilla** (S. Watson) Mattf. var. **diffusa** (Maguire) McNeill, *comb. nov.*

≡ *Arenaria pusilla* S. Watson var. *diffusa* Maguire, Amer. Midl. Nat. **46**: 508 (1951).

**Minuartia rosei** (Maguire et Barneby) McNeill, *comb. nov.*

≡ *Arenaria rosei* Maguire et Barneby, Leaflet W. Bot. **8**: 56 (1956).

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